

# Wind Energy

2010 Zoning Ordinance Amendments

Planning Commission Work Session

March 2, 2010



# Presentation Overview

- Types of Wind Energy Systems
- Scale of Wind Energy Systems
- Wind Distribution in Roanoke County
- Guidance from Planning Commission
  - Permitted Uses
  - General Use and Design Standards



# Types of Wind Energy Systems

- **Wind Energy System, Small:** A wind energy conversion system designed to supplement other electricity sources as an **accessory** use to existing buildings or facilities, wherein the power generated is used for **onsite consumption**.

A small wind energy system consists of a single wind turbine, a tower, and associated control or conversion electronics, having a rated name plate capacity of not more than **50 kilowatts** (kW) for residential uses and not more than **100 kilowatts** (kW) for other uses. For the purpose of residential net metering, Virginia Code §56-594B limits the electrical generating facility to a capacity of not more than **10 kilowatts** (kW) and **500 kilowatts** (kW) business/ commercial.



# Types of Wind Energy Systems

- **Wind Energy System, Micro Wind System**  
*(Building Integrated)*: A building-mounted wind energy conversion system that has a manufacturer's rating of **10 kW or less** and projects no more than **fifteen (15) feet** above the highest point on the roof and shall not be considered a small wind energy system in terms of area and setback requirements.





# Types of Wind Energy Systems

- **Wind Energy System, Hybrid**: An energy conversion system that uses more than one technology to produce energy or work (i.e. a wind-solar system).



# Types of Wind Energy Systems

- **Wind Monitoring Meteorological Tower:** A **temporary** tower equipped with devices to measure wind speeds and direction, used to determine how much wind power a site can be expected to generate.



# Types of Wind Energy Systems

- **Windmill**: A machine designed to convert the energy of the wind into more useful forms of energy using rotating blades to turn mechanical equipment to do physical work, without producing energy.  
Windmills are **no greater than 60 feet** in height and are operated by the wind usually acting on oblique vanes or sails that radiate from a horizontal shaft.  
Wind mills, as defined, are **not regulated as small wind energy systems**. Possible uses would be a wind-driven water pump or electric generator.



# Types of Wind Energy Systems

- ✦ **Wind Energy System, Large:** A wind energy conversion system used primarily to generate energy for **on-site use** consisting of one or more turbines, towers, and associated controls or conversion electronics, having a rated nameplate capacity of **not more than 999 kilowatts (kW)**.

For the purpose of net metering, Virginia Code §56-594B limits the electrical generating facility to a capacity of not more than **500 kilowatts (kW)**.





# Types of Wind Energy Systems

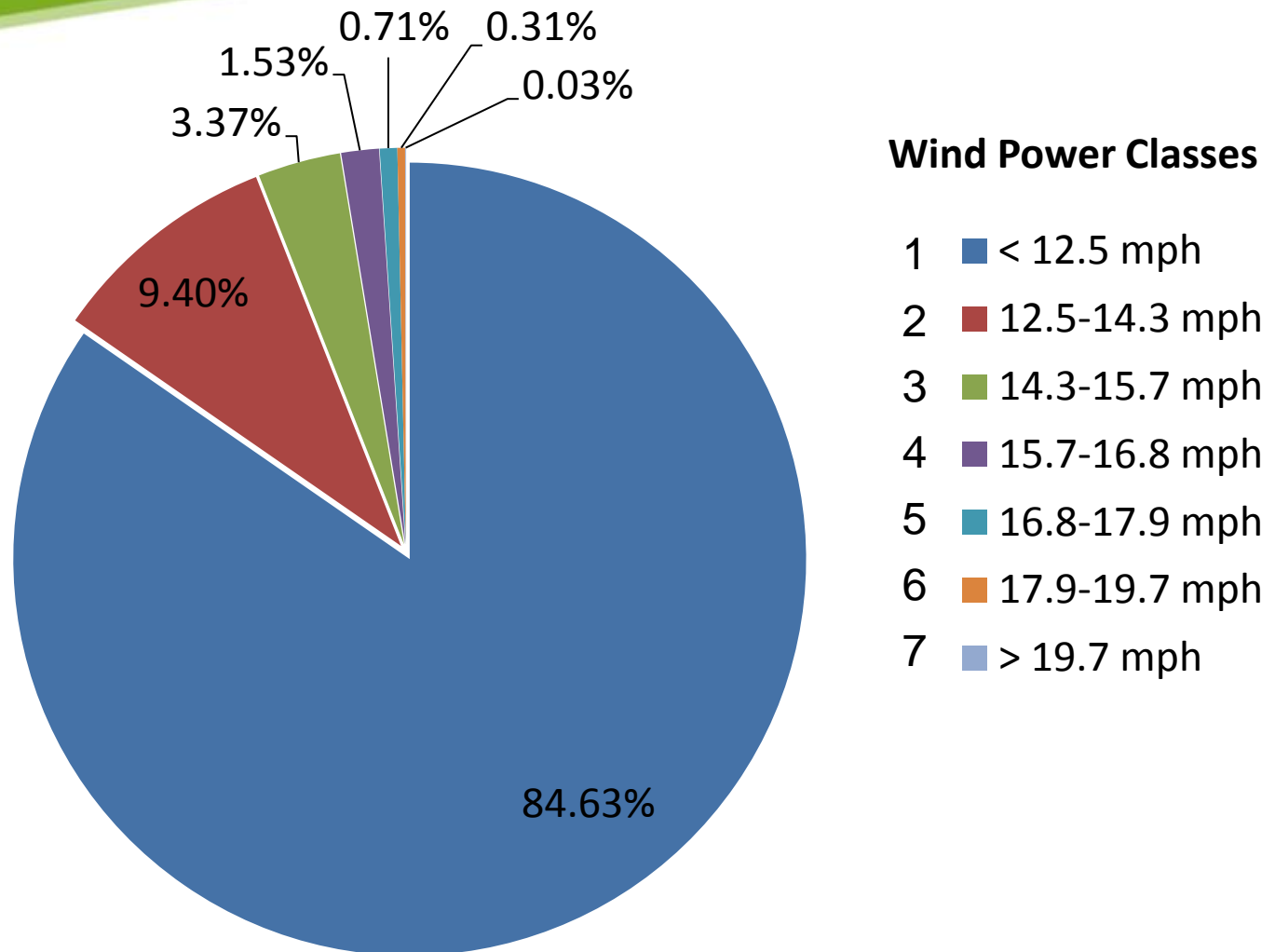
- **Wind Energy System, Utility-scale:** A wind energy conversion system usually used to generate energy for sale to off-site users consisting of **more than one turbine**, which has a rated name plate capacity of more than **1 MW or greater**.

The system is not limited to storage, electrical collection and supply equipment, service and access roads, and transformers.



Photo Courtesy of Tara Pattisall

# Wind Distribution in Roanoke County

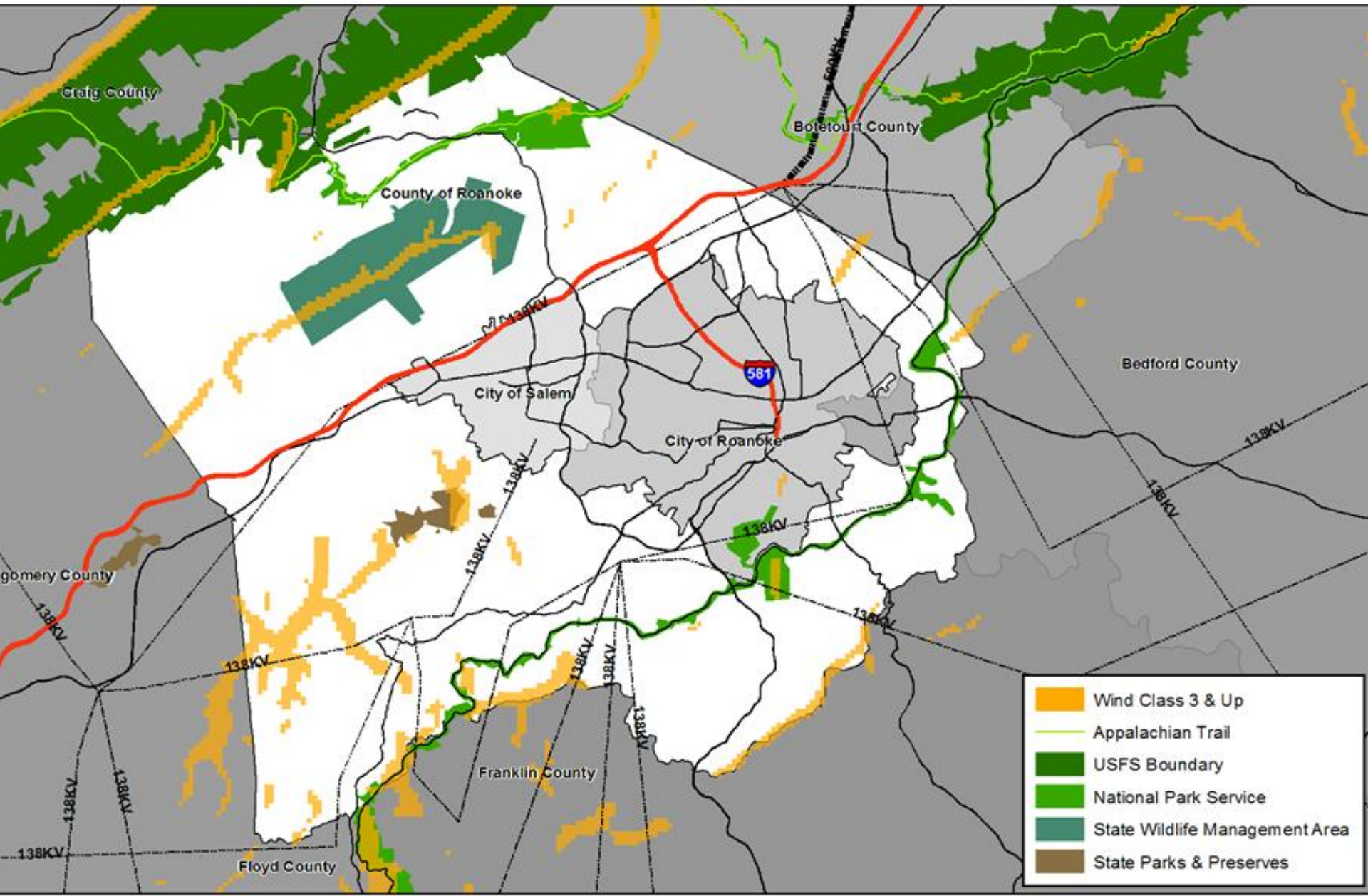


# Scale of Wind Energy Systems

Wind Class	Potential For Wind Development
<b>Class 1 or 2</b>	<ul style="list-style-type: none"><li>▪ Marginal for onsite</li><li>▪ Unsuitable to marginal for community-scale</li><li>▪ Unsuitable for utility-scale</li></ul>
<b>Class 3</b>	<ul style="list-style-type: none"><li>▪ Appropriate for onsite</li><li>▪ Marginal to appropriate for community-scale</li><li>▪ Unsuitable for utility-scale</li></ul>
<b>Class 4</b>	<ul style="list-style-type: none"><li>▪ Appropriate for onsite or community-scale</li><li>▪ Marginal for utility-scale</li></ul>
<b>Class 5+</b>	<ul style="list-style-type: none"><li>▪ Appropriate for all scales</li></ul>

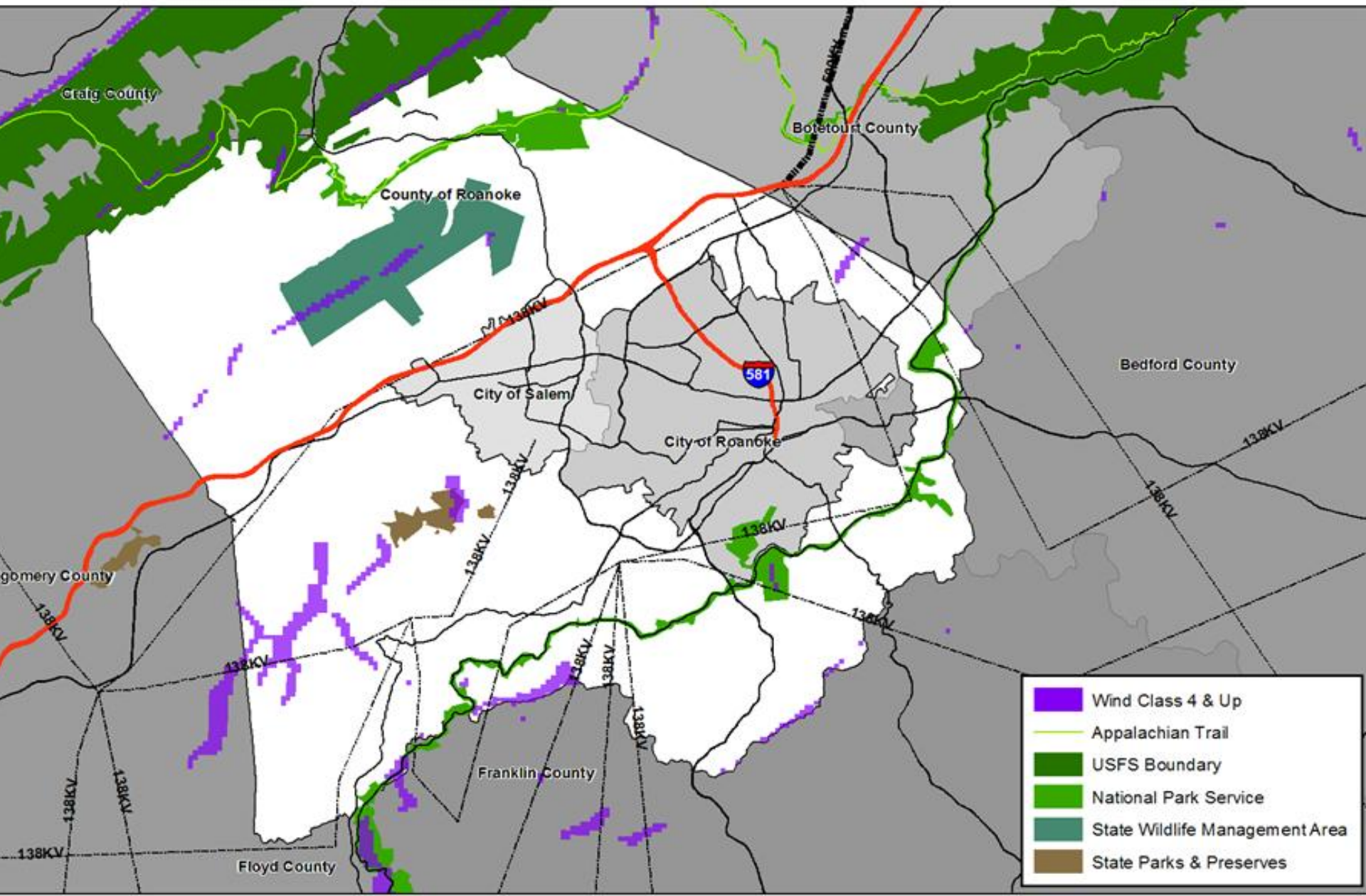
Source: Virginia renewables Siting Scoring Systems (VrS<sup>3</sup>)

# Large Scale Energy Systems (Class 3±)





# Utility Scale Energy Systems (Class 4±)



# Current “Tall Structures” Zoning Regulations

## Amateur Radio Towers

- Minimum Setback
  - 40% height of tower to any residential structure on adjoining lot
- Maximum Height
  - 100 feet in agricultural zoning districts (SUP to exceed this height)
  - 75 feet in residential, commercial and industrial zoning districts





# Current “Tall Structures” Zoning Regulations

## Broadcast Towers

### ■ Minimum Setback

- 40% height of tower to any residential structure on adjoining lot

### ■ Maximum Height

- 199 feet in agricultural, commercial and industrial zoning districts

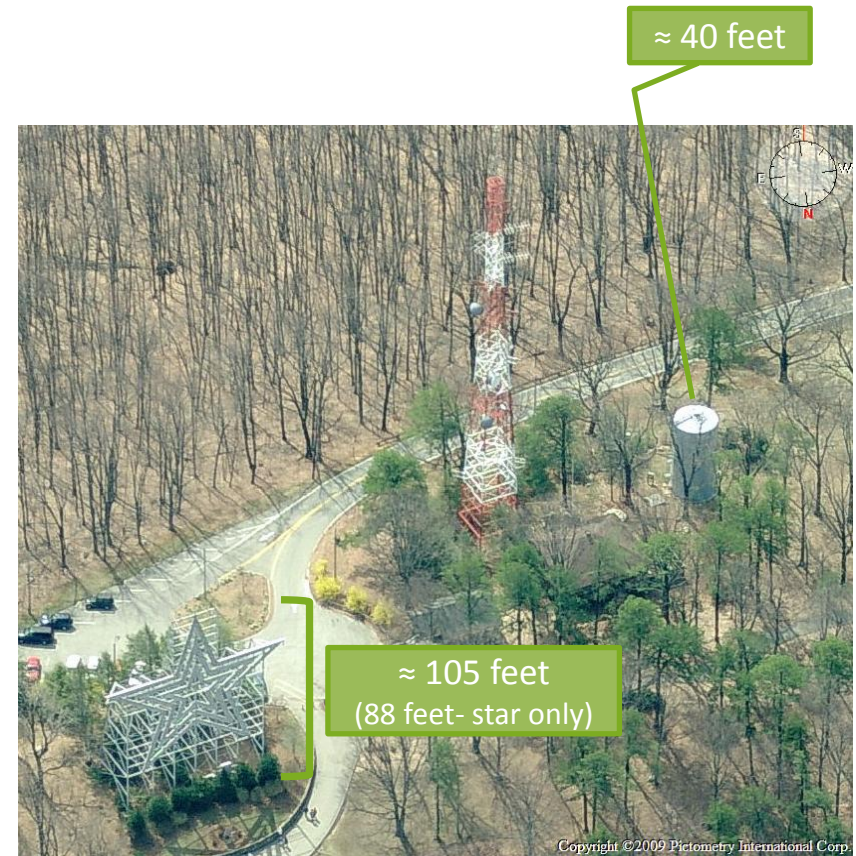
Fort Lewis Mountain



Seven towers vary in height from 70 - 235 feet



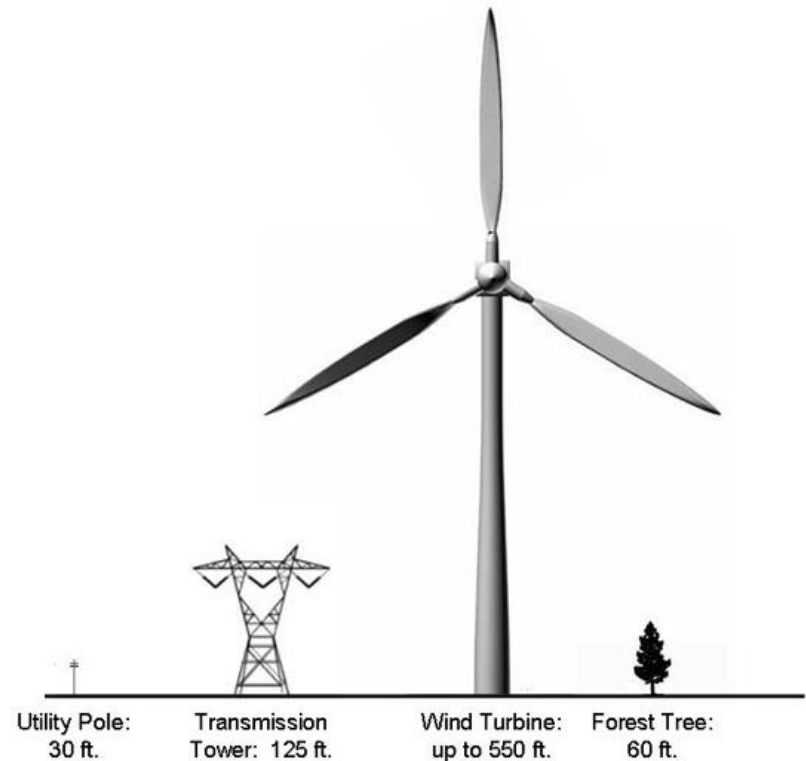
# Tall Structures in the Roanoke Valley





# Guidance from Planning Commission...

1. Permitted versus Conditional Uses
2. Maximum Height of Turbines
3. Minimum Lot Sizes
4. Setbacks/Fallzones



# Permitted versus Conditional Use

TYPE OF SYSTEM	AG-3	AG-1	AR	AV	R-1	R-2	R-3	R-4	PRD	R-MH	NC	C-1	C-2	PCD	I-1	I-2	PTD	EP
Small	R*	R*	R*	R*	R*	R*	S	S	?		R*	R*	R*	?	R*	R*	?	?
Micro (Building Integrated)	R*	R*	R*	R*	R*	R*	R*	R*	?	R*	R*	R*	R*	?	R*	R*	?	?
Large	S	S	S	S					?		S	S	S	?	S	S	?	?
Utility	S	S							?					?			?	?
Hybrid	R*	R*	R*	R*	R*	R*	R*	R*	?	R*	R*	R*	R*	?	R*	R*	?	?
Wind Mill	R*	R*	R*	R*					?					?			?	?

# General Use and Design Standards

Wind Energy Facility Type	Minimum Lot Size (acres)	Minimum Setback Requirements (1)				Maximum Height (feet)
		Occupied Building (Subject Property) (2)	Occupied Buildings (Adjacent Property) (2,3)	Property Lines (2)	Right-of-Way (2)	
<b>Small System</b>	0.46 (20,000 sq ft)	0	1.5	1.1	1.5	120
<b>Large System</b>	5	1.1	2.0	1.1	1.5	250
<b>Utility Scale</b>	25	1.5	2.5	1.5	1.5	500

(1) Measured from the center of wind turbine base to the property line, right-of-way, or nearest point on the foundation of an occupied building.

(2) Calculated by multiplying the required setback number by the wind turbine height.

(3) This setback proposes to reduce noise and shadow flicker impacts to any existing occupied building on adjacent properties.

# Questions, Comments, Concerns?

